

What is Claimed:

1. An isolated nucleic acid encoding a RB polypeptide, wherein the nucleic acid comprises a polynucleotide sequence at least 70% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7, and wherein the polypeptide, when produced in a solanaceous plant,  
5 confers disease resistance in the plant.
2. The nucleic acid of claim 1, wherein the nucleic acid comprises a polynucleotide sequence at least 95% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7.
3. The nucleic acid of claim 1, wherein the polynucleotide sequence is SEQ ID NO:4.
- 10 4. The nucleic acid of claim 1, wherein the polynucleotide sequence is SEQ ID NO:7.
5. The nucleic acid of claim 1, wherein the nucleic acid is isolated from *Solanum Bulbocastanum*.
6. The nucleic acid of claim 1, wherein the plant is from the Solanum species
7. The nucleic acid of claim 6, wherein the plant is selected from the group consisting of  
15 potato, tomato and eggplant.
8. A nucleic acid of claim 1, wherein the polypeptide, when produced in a plant, confers disease resistance to an oomycete pathogen.
9. The nucleic acid of claim 8, wherein the oomycete pathogen is *Phytophthora infestans*.
10. An isolated nucleic acid encoding a RB polypeptide, wherein the nucleic acid encodes a  
20 polypeptide having an amino acid sequence at least 70% identical to the amino acid sequence of SEQ ID NO:8 and wherein the polypeptide, when produced in a plant, confers disease resistance in the plant.
11. The nucleic acid of claim 10, wherein the polypeptide has an amino acid sequence at least 95% identical to SEQ ID NO:8.

12. The nucleic acid of claim 10 wherein the polypeptide is SEQ ID NO:5 or SEQ ID NO:8.
13. A recombinant expression cassette comprising a promoter sequence operably linked to a nucleic acid encoding a RB polypeptide, wherein the nucleic acid encodes a polynucleotide sequence at least 70% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7 and wherein the polypeptide, when produced in a solanaceous plant, confers disease resistance in the plant.
14. The expression cassette of claim 13, wherein the nucleic acid comprises a polynucleotide sequence at least 95% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7.
15. The expression cassette of claim 13, wherein the polynucleotide sequence is SEQ ID NO:4.
16. The expression cassette of claim 13, wherein the polynucleotide sequence is SEQ ID NO:7.
17. The expression cassette of claim 13, wherein the nucleic acid is operably linked to the promoter sequence in an antisense orientation.
18. The expression cassette of claim 13, wherein the nucleic acid is operably linked to the promoter sequence in a sense orientation..
19. The expression cassette of claim 13, wherein the polypeptide confers disease resistance to an oomycete pathogen.
20. The expression cassette of claim 19, wherein the oomycete pathogen is *Phytophthora infestans*.
21. The expression cassette of claim 13, wherein the promoter is a constitutive promoter.
22. The expression cassette of claim 13, wherein the promoter is a tissue specific promoter.
23. The expression cassette of claim 13, wherein the promoter sequence is SEQ ID NO:23.

24. A host cell transformed with the expression cassette of claim 13.
25. The host cell of claim 24 wherein the host cell is a plant cell from a solanaceous plant.
26. A transgenic solanaceous plant comprising a recombinant expression cassette comprising a promoter sequence operably linked to a nucleic acid encoding a RB polypeptide, wherein the  
5 nucleic acid comprises a polynucleotide sequence at least 70% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7, and wherein the polypeptide, when produced in the plant, confers disease resistance in the plant.
27. The transgenic plant of claim 26, wherein the nucleic acid is operably linked to the promoter sequence in an antisense orientation.
- 10 28. The transgenic plant of claim 26, wherein the nucleic acid is operably linked to the promoter sequence in a sense orientation.
29. The transgenic plant of claim 26, wherein the polypeptide confers disease resistance to an oomycete pathogen.
30. The transgenic plant of claim 26, wherein the oomycete pathogen is *Phytophthora*  
15 *infestans*.
31. The transgenic plant of claim 26, wherein the plant is from the *Solanum* species.
32. The transgenic plant of claim 31, wherein the plant is a potato plant.
33. An isolated RB polypeptide comprising an amino acid sequence at least 70% identical to SEQ ID NO:8 and wherein the polypeptide, when produced in a solanaceous plant, confers  
20 disease resistance in the plant.
34. The polypeptide of claim 33, wherein the amino acid sequence is SEQ ID NO:5.
35. The polypeptide of claim 33, wherein the amino acid sequence is SEQ ID NO:8.
36. An antibody immunologically specific for the polypeptide of claim 33.

37. The antibodies of claim 36, immunologically specific for an amino-terminal portion of a polypeptide of claim 36.
38. A method of enhancing disease resistance in a solanaceous plant, the method comprising introducing a construct comprising a promoter operably linked to a nucleic acid encoding a RB polypeptide wherein the nucleic acid comprises a polynucleotide sequence at least 70% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7, and wherein the polypeptide, when produced in a plant, confers disease resistance in the plant.
39. The method of claim 38, wherein the nucleic acid comprises a polynucleotide sequence at least 95% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7.
40. The method of claim 38, wherein the polynucleotide sequence is at SEQ ID NO:4.
41. The method of claim 38, wherein the polynucleotide sequence is at SEQ ID NO:7.
42. The method of claim 38, wherein the promoter is SEQ ID NO:23.
43. The method of claim 38, wherein the method enhances disease resistance to an oomycete pathogen.
44. The method of claim 43, wherein the oomycete pathogen is *Phytophthora infestans*.
45. The method of claim 38, the method further comprising selecting a plant with a phenotype associated with increased disease resistance.
46. A kit for enhancing disease resistance in a solanaceous plant, the kit comprising a construct comprising a promoter operably linked to a nucleic acid encoding a RB polypeptide wherein the nucleic acid comprises a polynucleotide sequence at least 70% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7, and wherein the polypeptide, when produced in a plant, confers disease resistance in the plant.
47. The nucleic acid of claim 1 wherein the polynucleotide is labeled.
48. An isolated nucleic acid comprises a polynucleotide sequence which hybridizes under stringent conditions to SEQ ID NO:4 or SEQ ID NO:7 or the complement thereof, wherein said

nucleic acid encodes a RB polypeptide and wherein the polypeptide, when produced in a solanaceous plant, confers disease resistance in the plant wherein the hybridization reaction is incubated at 42°C. in a solution comprising 50% formamide, 5x SSC, and 1% SDS or at 65°C. in a solution comprising 5x SSC and 1% SDS, with a wash in 0.2x SSC and 0.1% SDS at 65°C.

- 5     49.     The nucleic acid of claim 48, wherein the plant is selected from the group consisting of potato, tomato and eggplant.
50.     A nucleic acid of claim 48, wherein the polypeptide, when expressed in a plant, confers disease resistance to an oomycete pathogen.
- 10     51.     An isolated nucleic acid molecule for controlling expression of genes in transformed plant cells, which comprises a segment of a RB gene from a plant species selected from the *Solanaceae* species, the segment commencing at a location about 2,500 bases upstream from a transcription initiation site of the gene, and ending at a location about 250 bases downstream from the transcription initiation site.
52.     The nucleic acid molecule of claim 51, wherein the plant is a potato plant.
- 15     53.     The nucleic acid molecule of claim 51, isolated from a gene having a coding sequence at least 70% identical to SEQ ID NO:7.
54.     A fragment of the nucleic acid molecule of claim 51, comprising a segment commencing at about 2,500 bases upstream from the transcription initiation site and terminating about 25 bases downstream from the transcription initiation site.
- 20     55.     The nucleic acid molecule of claim 51, isolated from a gene having a coding sequence coding sequence at least 70% identical to SEQ ID NO:7.
56.     A DNA segment for effecting expression of coding sequences operably linked to the segment, isolated from a RB gene whose coding region hybridizes under stringent conditions with a coding region defined by SEQ ID NO:7, the segment comprising a promoter and a  
25     transcription initiation site.

57. The DNA segment of claim 56, which further comprises an element that confers disease resistance on expression of the coding sequences.
58. The DNA segment of claim 56, isolated from *S. Bulbocastanum*.
59. A DNA segment for modulating expression of coding sequences operably linked to the  
5 segment, isolated from a gene whose coding region hybridizes under stringent conditions with a coding region defined by SEQ ID NO:7, the segment comprising a polyadenylation signal.
60. The DNA segment of claim 59, isolated from *S. Bulbocastanum*.
61. An expression cassette comprising the nucleic acid molecule of claim 51 operably linked to a nucleic acid encoding a polypeptide, wherein the nucleic acid encodes a polynucleotide  
10 sequence at least 70% identical to a polynucleotide sequence as shown in SEQ ID NO:4 or SEQ ID NO:7.
62. A cell transformed with the expression cassette of claim 61.
63. The transformed cell of claim 62, which is a potato plant cell.
64. A transgenic potato plant produced by regenerating the transformed plant cell of claim  
15 63.
65. A reproductive unit of the transgenic plant of claim 64.